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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/520,662

09/26/2005

Takashi Yasoshima

Q85681

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04/20/2009

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EXAMINER

SOLOMON, LISA

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/520,662	<b>Applicant(s)</b> YASOSHIMA ET AL.	
	<b>Examiner</b> LISA M. SOLOMON	<b>Art Unit</b> 2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 1-26,36 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27, 29-35 is/are rejected.
- 7) ☒ Claim(s) 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 27, 29-31, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata, Yoshinao (JP 2002160366A) in view of Yasukawa et al. (2002/0140782).

***Miyata, Yoshinao teaches a method of manufacturing a liquid jet head including a passage-forming substrate (10, Fig. 1) in which pressure generating chambers (12, Fig. 1) communicating with nozzle orifices (21, Fig. 1) for jetting liquid are formed [See Fig. 1]; piezoelectric elements (300, Fig. 1) which are provided on one side of the passage-forming substrate (10) with a vibration plate (50, Fig. 1) interposed therebetween and cause pressure changes in the pressure generating chambers (12) [Abstract and See also Fig. 1]; and a sealing plate (30, Fig. 1) which is made of a single crystal silicon substrate and has a piezoelectric element holding portion (41, Fig. 1) for sealing a space sufficient enough so as not to inhibit movement of the piezoelectric elements (300) in a state where the space is ensured, the sealing plate (30) further having a reservoir portion (31, Fig. 2) constituting at least part of a reservoir (100, Fig. 2) communicating with the***

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***pressure generating chambers (12) [Abstract and See Figs. 1-2], the method comprising the steps of:***

**In re claim 27:** forming a mask pattern ` (130, Fig. 4) on a surface of a sealing plate (30) forming material, which becomes the sealing plate [See Fig. 4]; forming the reservoir portion (31) and the piezoelectric element holding portion (41) by etching the sealing plate (30) forming material except a region where the mask pattern (130) has been formed [See Figs. 4-5 and 8]; removing the mask pattern (130) to form the sealing plate (30) [See Figs. 4-5 and 8]; and joining the passage-forming substrate (10), in which the piezoelectric elements (300) have been formed, and the sealing plate (30) [See Figs. 1-2].

**In re claim 30:** forming interconnections (120, Fig. 2) for connecting the piezoelectric elements (300) and a drive IC (110, Fig. 2) for driving the piezoelectric elements (300), on the sealing plate (30) on an opposite side to the piezoelectric element holding portion (31) [See Fig. 2 (a)].

**In re claim 34:** the piezoelectric element holding portion (41) and the reservoir portion (31) are formed by etching the sealing plate (30) forming material by use of an insulation film as the mask pattern (130), the insulation film being formed by thermally oxidizing the sealing plate forming material [Abstract and See also Figs. 4-5].

**In re claim 35:** forming interconnections (120) for connecting the piezoelectric elements (300) and a drive IC (110) for driving the piezoelectric elements (300), on the insulation film, before the step of forming the piezoelectric element holding portion (41) and the reservoir portion (31) [See Figs. 2 and 4-5].

Miyata, Yoshinao (JP 2002160366) does not teach:

**In re claim 27:** forming a protective film having resistance to liquid at least on an inner wall surface of the reservoir portion in the sealing plate

**In re claim 28:** the protective film is formed on an entire surface of the sealing plate including the inner wall surface of the reservoir portion

**In re claim 29:** the protective film made of silicon dioxide is formed by thermally oxidizing the sealing plate

**In re claim 30:** the step of forming the protective film

**In re claim 31:** the protective film made of dielectric material is formed by physical vapor deposition

***Yasukawa et al. (2002/0140782) teaches:***

**In re claim 27:** forming a protective film having resistance to liquid at least on an inner wall surface of the reservoir portion in the sealing plate [Paragraph 81, See also Figs. 16-19].

**In re claim 29:** the protective film made of silicon dioxide is formed by thermally oxidizing the sealing plate [Paragraphs 83-89].

**In re claim 30:** the step of forming the protective film [Paragraphs 81 and 83-89].

**In re claim 31:** the protective film made of dielectric material is formed by physical vapor deposition [Paragraph 83].

Note: It is well known in the electrical arts for silicon dioxide to be a dielectric material as taught by the Silicon Dioxide article from <http://www.azom.com> [see attached PDF document].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide forming a protective film having resistance to liquid at least on an inner wall surface of the reservoir portion in the sealing plate (claim 27), the protective film made of silicon dioxide is formed by thermally oxidizing the sealing plate (claim 29), the step of forming the protective film (claim 30), and the protective film made of dielectric material is formed by physical vapor deposition (claim 31) as taught by Yasukawa et al. (2002/0140782) in the method of manufacturing of Miyata, Yoshinao (JP 2002160366) for the purposes of preventing the degradation of print quality due to the difference in thermal expansion piezoelectric vibrating element and the liquid jet head unit.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata, Yoshinao (JP 2002160366) in view of Yasukawa et al. (2002/0140782) as applied to claims 27-31 and 34-35 above, and further in view of Yamada et al. (2002/0004150).

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Miyata, Yoshinao (JP 2002160366) and Yasukawa et al. (2002/0140782) does not teach:

**In re claim 32:** the protective film is formed by any one of reactive ECR sputtering, facing-target sputtering, ion beam sputtering, and ion assisted deposition

***Yamada et al. (2002/0004150) teaches:***

**In re claim 32:** the protective film is formed by ion beam sputtering [Paragraph 102].

Note: Ion beam sputtering is a commonly known method of forming a protective film as taught by the prior art of Yamada et al. (2002/0004150).

It would have been obvious to one ordinary skill in the art at the time the invention was made to provide a protective film formed by ion beam sputtering as taught by Yamada et al. (2002/0004150) in the method of manufacturing of Miyata, Yoshinao (JP 2002160366) and Yasukawa et al. (2002/0140782) for the purposes of forming a protective film by a known method [Yamada et al. (2002/0004150) Paragraph 102].

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata, Yoshinao (JP 2002160366) in view of Yasukawa et al. (2002/0140782) as applied to claims 27-31 and 34-35 above, and further in view of Nagatomo et al. (2002/0041296).

Miyata, Yoshinao (JP 2002160366) and Yasukawa et al. (2002/0140782) does not teach:

**In re claim 33:** the protective film is made of any one of tantalum oxide, silicon nitride, aluminum oxide, zirconium oxide, and titanium oxide

***Nagatomo et al. (2002/0041296) teaches:***

**In re claim 33:** the protective film is made of silicon nitride [Paragraph 177].

Note: Silicon nitride is a material that is commonly used as a protective film in the manufacturing of liquid jet heads as taught by Nagatomo et al. (2002/0041296).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a protective film made of silicon nitride as taught by Nagatomo et al. (2002/0041296) in the method of manufacturing of Miyata, Yoshinao (JP 2002160366) and Yasukawa et al. (2002/0140782) for the purposes of forming a protective film to protect a liquid jet head from various liquids such as ink [Nagatomo et al. (2002/0041296) Paragraph 102].

***Allowable Subject Matter***

3. Claims 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The primary reason for allowance of claims 28 is the inclusion of the limitation of a method of manufacturing a liquid jet head that includes “the protective film is formed on an entire surface of the sealing plate including the inner wall surface of the reservoir portion” (claim 28). It is this limitation found in the claims, as it is claimed in the



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combination that has not been found, taught or suggested by the prior art of record, which makes these claims allowable over prior art.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LISA M. SOLOMON whose telephone number is (571)272-1701. The examiner can normally be reached on Monday - Friday from 8:00 am - 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW LUU/  
Supervisory Patent Examiner, Art Unit 2861

Lisa M Solomon  
Examiner  
Art Unit 2861

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